

NASA SBIR/STTR Technologies

H13.02-9289 - Microwave Inspection Nondestructive Imaging Array



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Identification and Significance of Innovation

Physical Optics Corporation (POC) proposes to develop a new Microwave Inspection Nondestructive IMaging Array (MINIMA) based on the novel integration of new compact near-field microwave imaging and optical sensors along with analysis software. The proposed innovation takes advantage of three underlying technologies: the Microwave and Optical Sensor Unit (MOSU), which combines near-field microwave and optical imaging inspection technologies for nondestructive inspection; the Local Position and Orientation Module (LPOM), which tracks the position, orientation, and motion of the MOSU; and the Data Processing and Display (DPD) software, which tiles together the data to create a registered microwave/optical structural map for locating and identifying defects on the structure for assessment by the crew without requiring a spacewalk. The MINIMA is an advanced NDE technology that will expand NASA's inspection capabilities to improve safety and efficiency for current and future space missions.

Estimated TRL at beginning and end of contract: (Begin: 3 End: 4)

Technical Objectives and Work Plan

Technical Objectives

Objective 1. Development of a preliminary design of the overall MINIMA system and analysis to determine optimal parameters of system components.

Objective 2. Design of the subsystems of MINIMA.

Objective 3. Integration, testing, and evaluation of MINIMA system prototype.

Objective 4. Preliminary definition of the commercial promise of the MINIMA technology.

Work Plan

Task 1. Define Requirements and Specify Overall MINIMA System Concept

Task 2. Design and Model MOSU and Select Sensor Hardware

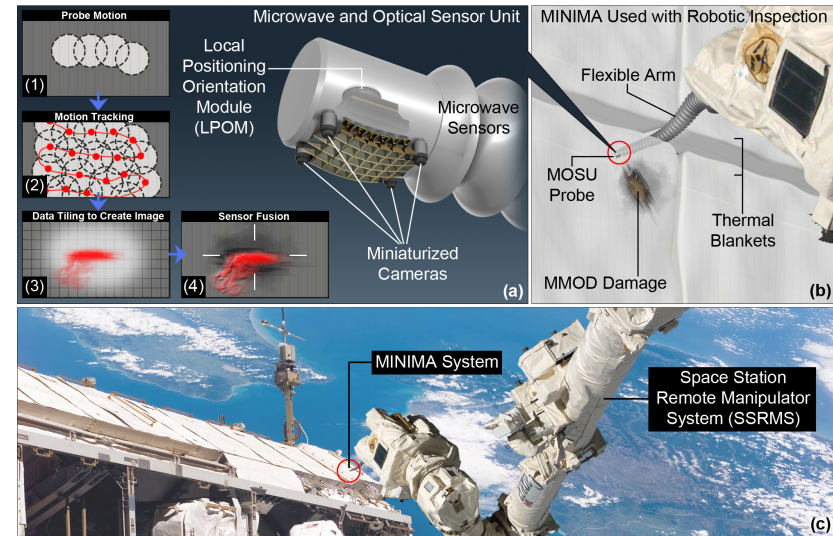
Task 3. Design and Develop Approach for Sensor Data Acquisition

Task 4. Develop DPD Software and Graphical User Interface

Task 5. Demonstrate Potential of MINIMA Concept

Task 6. Explore the Commercial Potential and Product Viability

Task 7. Manage Project, including Preparation and Submission of Reports



NASA Applications

The MINIMA system will provide new capabilities for periodic spacecraft nondestructive evaluation (NDE) and reliability monitoring. In particular, periodic NDE and maintenance are an integral and critical element in NASA's proposed paradigm for structural reliability in 2030: the Virtual Digital Flight Leader (VDFL), which integrates modeling and situational awareness to provide status and health monitoring updates to continuously forecast the probability of mission success.

Non-NASA Applications

MINIMA will find wide application in NDE and maintenance for advanced aerospace and maritime structures for both civilian and military use. The MINIMA system can be integrated as a module to autonomously inspect commercial aircraft to ensure aircraft reliability. In addition, with minimal modifications, MINIMA can be applied to the inspection of civil structures.

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NON-PROPRIETARY DATA